

node evaluation system having functions passed between nodes of a dependency graph of a graphics creating process, the system evaluating the dependency graph with the functions passed between the nodes.

21. (ONCE AMENDED) A data structure provided on computer readable storage controlling a computer in association for evaluating a dependency graph of a graphics creation process, the data structure comprising an RTTI parameter list, a mapping substructure comprising an index mapping, mapping methods, and a data casting matrix, a function pointer, and methods for setting inputs, getting outputs, and evaluating a passed function.

22. (ONCE AMENDED) A method, comprising:  
evaluating a dependency graph of a graphics creation process using a computer,  
comprising:

performing, by a destination node, of an algorithm having a function known to the destination node by evaluating a self evaluating data structure passed from a source node and expected to precisely implement the function known to the destination node where the self evaluating data structure can comprise a different function with different parameters and performing the different function actually requested by the destination node.

### REMARKS

In the Office Action mailed August 8, 2002, the Examiner noted that claims 1-22 were pending and rejected all claims. Claims 1, 17, and 19-22 have been amended and, thus, in view of the forgoing claims 1-22 remain pending for reconsideration which is requested. No new matter has been added. The Examiner's rejections and objections are traversed below.

On page 2 of the Office Action the Examiner objected to the drawings noting that figure 3 should be designated by a "Prior Art" legend. Figure 3, as discussed on page 5 of the application, depicts an implementation of a system of the present invention. As such, a system as in figure 3 which includes the invention is contended to not be prior art. As a result, labeling figure 3 as prior art would be inaccurate. Figure 3 particularly supports apparatus claims, such as claim 20. This requirement to label figure 3 with a prior art label is respectfully traversed. On page 2 the Examiner also objected to the drawings because they allegedly fail to show a computer, keyboard mouse and display as described in the specification. The Examiner is requested to note that figure 3 shows these elements. In particular, figure 3 shows a computer

using reference number 12, a keyboard using reference number 14 and a mouse or stylus using reference number 16 and a display using reference number 18. Since these elements are shown the requirement to show these elements is respectfully traversed. Withdrawal of the objection to the drawings is respectfully requested.

In the Office Action on pages 3 and 4, the Examiner rejected all claims as directed to non-statutory subject matter. The Examiner noted that the disclosed invention has a practical application and is within the technological arts and also alleged that the claimed process must be limited to a practical application and that no limitation to a practical application was found in the claimed method. In making the rejection the Examiner stated as a basis:

However, the steps of the method do not recite any post-computer process activity, i.e., no independent physical acts, and the steps of the method do not recite any pre-computer process activity, i.e., no manipulation of data representing physical objects or activities.

The Examiner is requested to note that these bases for rejecting claims as non-statutory are outmoded (see attached appeal decision 1999-1932). Nevertheless, the body of the independent claims has been amended to clarify the practical application and useful, concrete and tangible result of evaluating a dependency graph using a computer. Withdrawal of the rejection is requested.

On page 5 of the Office Action the Examiner rejected all claims under 35 U.S.C. section 102 as anticipated by Wells.

Wells is directed to a system where a directed acyclic graph (DAG) is used to graphically represent computer analysis operations. In contrast, the present invention is directed at using dependency graphs in a graphics creation process, a completely different purpose. Wells is also directed to a graph in which the nature of the nodes in the graph is static. The Wells graph is no more than a pictorial representation of a series of operations which are static in nature. In contrast, the nodes of the present invention are dynamic. This dynamic nature involves a node being passed a function from another node and then being able to evaluate or execute that passed function as part of the evaluation of that node. That is, the nature of the node changes because it can have a function passed to it from another node. There is no discussion in Wells concerning the passing of functions between nodes. The ability to pass a function from one node to another node allows the graph to essentially dynamically reconfigure itself allowing operations that appears earlier in the graph to be altered. Wells does not recognize the possibility of much less provide this capability. Passing a function from one node to another

node is emphasized in the independent claims (see claims 1, 17, 19, 20, 21 and 22). It is submitted that the present claimed invention patentably distinguishes over Wells and withdrawal of the rejection is requested.

The dependent claims depend from the above-discussed independent claims and are patentable over the prior art for the reasons discussed above. The dependent claims also recite additional features not taught or suggested by the prior art. For example, claim 2 emphasizes that the function being passed is a self evaluating data structure, Wells says nothing about this. Claim 4 allows the graph to point to the function being passed using a function pointer. There is no discussion of a function pointer in Wells. This pointer allows linking between the graph and the function to be determined dynamically something that Wells does not provide. Claim 5 emphasizes that the self evaluating data structure includes a method of calling the function. Wells does not address this. Claims 6 and 7 allow the passed parameter and the identity of the parameter to be determined dynamically during evaluation as the graph is executed. Nothing in Wells discusses this. The self evaluating graph data structure passed between nodes of claim 8 has information that defines what the function can accept and what it will produce. There is nothing like this in Wells. Claim 9 emphasizes that different data types can be used in a passed function if they are compatible. This increases the flexibility and functionality of the nodes and is not discussed in Wells. Claim 10 calls for mapping parameters. There is no mapping of parameters in Wells. Claim 13 allows input parameters to be ignored something not addressed by Wells. Claim 15 emphasizes that the index and the function are passed via the mapping again something not contemplated by Wells. Claims 16 and 18 emphasize that the type of data can be changed during the passing between nodes via the mapping. This is not discussed by Wells. It is submitted that the dependent claims are independently patentable over the prior art.

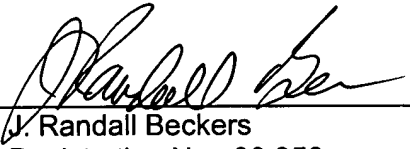
It is submitted that the drawings satisfy the drawing requirements. It is also submitted that the claims satisfy the requirements of 35 U.S.C. § 101. It is further submitted that the claims are not taught, disclosed or suggested by the prior art. The claims are therefore in a condition suitable for allowance. An early Notice of Allowance is requested.

If any further fees, other than and except for the issue fee, are necessary with respect to this paper, the U.S.P.T.O. is requested to obtain the same from deposit account number 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 11/21/12

By:   
J. Randall Beckers  
Registration No. 30,358

700 Eleventh Street, NW, Suite 500  
Washington, D.C. 20001  
(202) 434-1500

## VERSION WITH MARKINGS TO SHOW CHANGES MADE

### IN THE SPECIFICATION:

Please AMEND the paragraph beginning at page 5, line 9-28, as follows:

The present invention is typically included in a system, such as depicted in figure [1] 3, where a computer 12, such as a [a] Pentium III running Windows NT, is executing a graphics creation system, such as Maya™, as controlled by a user operating input devices such as a keyboard 14 and a mouse 16 or stylus, etc. The created graphic is displayed on a display 18 and the user is allowed to make modifications to the graphic. These modifications, as well as the original creation, are implemented through an evaluation controlled by the dependency graph where the present invention improves the speed of the evaluation by passing algorithms of the graph nodes.

### IN THE CLAIMS:

Please AMEND the following claims:

1. (ONCE AMENDED) A method, [of] comprising:  
evaluating a dependency graph of a graphics creation process using a computer,  
comprising:  
  - passing a function of a first dependency node to a second dependency node; and
  - evaluating the function as part of an evaluation of the second dependency node.
  
17. (ONCE AMENDED) A method, [of] comprising:  
evaluating a dependency graph of a graphics creation process using a computer,  
comprising:  
  - passing a function of a first dependency node to a second dependency node, the function comprising a self evaluating data structure comprising a function calling method and containing information describing a set of input and output parameters the function accepts where the information determines if function attribute types within the dependency graph are compatible and comprising default values for all input and output parameters;
  - mapping parameters of first and second functions of the first and second nodes, where the mapping comprises an index, defines a relationship where input parameters are ignored and output parameters are unmapped and take on default values, where

parameter value and type are passed for the mapping and the function data structure and value index are passed for the mapping; and

evaluating the function as part of an evaluation of the second dependency node comprising determining a type of a passed parameter where parameter types are identified dynamically as the dependency graph is executed.

19. (ONCE AMENDED) A method, comprising:

evaluating a dependency graph of a graphics creation process using a computer,  
comprising:

passing a function from a first node in a node network to a second node in the node network; and

evaluating the function as part of an evaluation of the second node.

20. (ONCE AMENDED) An apparatus comprising a computer including a dependency node evaluation system having functions passed between nodes of a dependency graph of a graphics creating process, the system evaluating the dependency graph with the functions passed between the nodes.

21. (ONCE AMENDED) A data structure provided on computer readable storage controlling a computer in association [with] for evaluating a dependency graph of a graphics creation process, the data structure comprising an RTTI parameter list, a mapping substructure comprising an index mapping, mapping methods, and a data casting matrix, a function pointer, and methods for setting inputs, getting outputs, and evaluating a passed function.

22. (ONCE AMENDED) A method, [of] comprising:

evaluating a dependency graph of a graphics creation process using a computer,  
comprising:

performing, by a destination node, of an algorithm having a function known to the destination node by evaluating a self evaluating data structure passed from a source node and expected to precisely implement the function known to the destination node where the self evaluating data structure can comprise a different function with different parameters and performing the different function actually requested by the destination node.

JRB  
1280.1001

Request for Reconsideration  
and  
Appeal to Court Appeals

due: 6-29-02

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

MAILED

APR 29 2002

PAT. & T.M. OFFICE  
BOARD OF PATENT APPEALS  
AND INTERFERENCES

Ex parte STEVEN M. BANKS  
and JOHN A. PANDIANI

Appeal No. 1999-1932  
Application 08/795,706<sup>1</sup>

HEARD: October 24, 2001

Before MARTIN, BARRETT, and LEVY, Administrative Patent Judges.  
BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1-24.

We reverse.

Application for patent filed February 4, 1997, entitled "Apparatus and Method for Probabilistic Population Size and Overlap Determination."

BACKGROUND

The disclosed invention relates to an apparatus (claims 1-13), a method (claims 14-23), and a computer program embodied on a computer-readable medium (claim 24) for probabilistically calculating a "population size" (the number of unique individuals in a data set) or "population overlap" (the number of unique people overlapping across multiple data sets) when confronted with a database of human data without unique identifiers for the human individuals.

Claim 1 is reproduced below.

1. An apparatus for probabilistic human population size determination, comprising a computer probabilistically calculating human population size of unique human individuals in data of a database representing humans, containing records on the unique human individuals without unique identifiers for the unique human individuals and having at least one common type of information with a known distribution of finite expectation, using decomposed probabilistic calculations based on values of the information with the known distribution.

No prior art is applied in the rejection.

Claims 1-24 stand rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter.

We refer to the final rejection (Paper No. 7) and the examiner's answer (Paper No. 13) (pages referred to as "EA\_\_") for a statement of the Examiner's position, and to the brief (Paper No. 12) (pages referred to as "Br\_\_") and the reply brief (Paper No. 14) (pages referred to as "RBr\_\_") for a statement of Appellants' arguments thereagainst.



OPINION

The law under 35 U.S.C. § 101

The most current analysis of nonstatutory subject matter under 35 U.S.C. § 101 is found in State St. Bank & Trust Co. v. Signature Fin. Group, Inc., 149 F.3d 1368, 47 USPQ2d 1596 (Fed. Cir. 1998) and AT&T v. Excel Communications, Inc., 172 F.3d 1352, 50 USPQ2d 1447 (Fed. Cir. 1999). State Street and AT&T modify the U.S. Patent and Trademark Office's Examination Guidelines for Computer-Related Inventions (Guidelines) 1184 Off. Gaz. Pat. & Trademark Office 87 (March 26, 1996), incorporated into the Manual of Patent Examining Procedure (MPEP) § 2106 (6th ed., Rev. 3, July 1997), although the Guidelines, State Street, and AT&T are all based on the "useful, concrete and tangible result" test of In re Alappat, 33 F.3d 1526, 1544, 31 USPQ2d 1545, 1557 (Fed. Cir. 1994) (en banc).

We derive the following general principles from State Street and AT&T.

1. There are only three categories of unpatentable subject matter, namely "laws of nature, natural phenomena, and abstract ideas." See State Street, 149 F.3d at 1373, 47 USPQ2d at 1600 (citing Diamond v. Diehr, 450 U.S. 175, 185 (1981)). There is no separate exception for mathematical algorithms. See Alappat, 33 F.3d at 1543, 31 USPQ2d at 1556 ("[The Supreme Court] never intended to create an overly broad, fourth category of

Appeal No. 1999-1932  
Application 08/795,706

[mathematical] subject matter excluded from § 101.). There is no "business method" exception to § 101. See State Street, 149 F.3d at 1375, 47 USPQ2d at 1602.

2. Mathematical algorithms are not patentable subject matter if "they are merely abstract ideas constituting disembodied concepts or truths that are not 'useful.'" State Street, 149 F.3d at 1373, 47 USPQ2d at 1601. "[T]he judicially-defined proscription against patenting of a 'mathematical algorithm,' to the extent such a proscription still exists, is narrowly limited to mathematical algorithms in the abstract." AT&T, 172 F.3d at 1356, 50 USPQ2d at 1450.

3. The new test for statutory subject matter is whether the claimed subject matter is directed to a "practical application" or "a useful, concrete and tangible result," that is, whether the claimed subject matter is applied in a practical manner to produce a useful result. "[C]ertain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, i.e., 'a useful, concrete and tangible result.'" State Street, 149 F.3d 1373, 47 USPQ2d at 1600-01 (citing Alappat, 33 F.3d at 1544, 31 USPQ2d at 1557)). "[T]he Alappat inquiry simply requires an examination of the contested claims to see if the claimed subject matter as a whole is a disembodied mathematical concept representing nothing more than a 'law of

nature' or an 'abstract idea,' or if the mathematical concept has been reduced to some practical application rendering it 'useful.'" AT&T, 172 F.3d at 1357, 50 USPQ2d at 1451. "[O]ur inquiry here focuses on whether the mathematical algorithm is applied in a practical manner to produce a useful result." Id. at 1360, 50 USPQ2d at 1453.

4. The older so-called Freeman-Walter-Abele<sup>2</sup> two-part test for statutory subject matter is said to have "little, if any, applicability to determining the presence of statutory subject matter." State Street, 149 F.3d at 1374, 47 USPQ2d at 1601, AT&T, 172 F.3d at 1359, 50 USPQ2d at 1453. The Freeman-Walter-Abele should not be applied to hold subject matter nonstatutory.

Comment: We believe that all subject matter which would have been statutory under the Freeman-Walter-Abele test is likewise statutory under the more inclusive "practical application" or "useful, concrete and tangible result" test. The Freeman-Walter-Abele test may continue to be a useful tool for making the threshold decision of which cases do not have problems since there is little case law on how to determine a "practical application" or "useful, concrete and tangible result." That is, the "practical application" or "useful, concrete and tangible

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<sup>2</sup> See In re Freeman, 573 F.2d 1237, 197 USPQ 464 (CCPA 1978), as modified by In re Walter, 618 F.2d 758, 205 USPQ 397 (CCPA 1980), and In re Abele, 684 F.2d 902, 214 USPQ 682 (CCPA 1982).

Appeal No. 1999-1932  
Application 08/795,706

result" test may be the exclusive test for determining nonstatutory subject matter, but it is probably not the exclusive test for determining whether subject matter is statutory.

5. A process does not require a physical transformation of something to a different state or thing. AT&T, 172 F.3d at 1359, 50 USPQ2d at 1452.

Comment: A process which does perform a physical transformation can safely be said to be statutory subject matter. Such physical transformations fall within the so-called "safe harbors" of the Guidelines and MPEP § 2106 IV.B.2.(b)(i)).

6. A process does not require physical limitations as long as it produces "a useful, concrete and tangible result." See State Street, 149 F.3d at 1374, 47 USPQ2d at 1602; AT&T, 172 F.3d at 1359, 50 USPQ2d at 1453. Physical limitations arose from the second part of the now-questioned Freeman-Walter-Abele test. See AT&T, 172 F.3d at 1359, 50 USPQ2d at 1452-53. As stated in State Street, 149 F.3d at 1373, 47 USPQ2d at 1601:

Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result" – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

Comment: The Court did not hold that mere transformation of data by a machine is sufficient; there must be "practical

Appeal No. 1999-1932  
Application 08/795,706

application" or "a useful, concrete and tangible result."  
Consequently, it cannot be said that a method being run on a computer inherently has practical utility and represents more than a mere abstract idea. This is consistent with cases that say a method performed on a computer is not necessarily statutory (although it is problematic to rely on statements in a non-majority opinion and on early cases). See Alappat, 33 F.3d at 1567, 31 USPQ2d at 1577 (C.J. Archer, concurring in part and dissenting in part) ("[A] claim formally to a general purpose computer running a certain program cannot be deemed to satisfy § 101 simply because the computer is a physical, tangible device."); In re Waldbaum, 559 F.2d 611, 194 USPQ 465 (CCPA 1977) (method of operating a data processor held nonstatutory as mathematical algorithm).

7. The statutory category to which a claim is directed is not determinative of statutory subject matter. See State Street, 149 F.3d at 1375, 47 USPQ2d at 1602 ("The question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to – process, machine, manufacture, or composition of matter – but rather on the essential characteristics of the subject matter, in particular, its practical utility."); AT&T, 172 F.3d at 1357-58, 50 USPQ2d at 1451; Alappat, 33 F.3d at 1542, 31 USPQ2d at 1556 (precedent suggests that the mathematical

Appeal No. 1999-1932  
Application 08/795,706

subject matter exception to § 101 does apply to true apparatus claims, citing In re Johnson, 589 F.2d 1070, 1077, 200 USPQ 199, 206 (CCPA 1978) ("Benson [referring to Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673 (1972)] applies equally whether an invention is claimed as an apparatus or process, because the form of the claim is often an exercise in drafting."); Alappat, 33 F.3d at 1567, 31 USPQ2d at 1577 (C.J. Archer, concurring in part and dissenting in part) ("[A] claim formally to a general purpose computer running a certain program cannot be deemed to satisfy § 101 simply because the computer is a physical, tangible device.").

Comment: Technically, this has been the law for a long time. See Johnson, 589 F.2d at 1077, 200 USPQ at 206 (Judge Rich's statement about Benson was a dissenting position adopted by the CCPA in In re Freeman, 573 F.2d 1237, 1247, 197 USPQ 464, 472 (CCPA 1978)); In re Maucorps, 609 F.2d 481, 485, 203 USPQ 812, 815 (CCPA 1979) ("Labels are not determinative in § 101 inquiries."). However, in the past, only process claims and claims drafted in means-plus-function format under 35 U.S.C. § 112, sixth paragraph, were held to be nonstatutory as a mathematical algorithm for reasons to be discussed. It is not clear how the new test applies to true apparatus.

In the beginning, starting with Benson, only process claims raised a question of nonstatutory subject matter. Mathematical

Appeal No. 1999-1932  
Application 08/795,706

algorithms are a series of steps for solving a problem and fit the definition of a process. A process is not limited to the means used in performing it. See In re Prater, 415 F.2d 1393, 1403, 162 USPQ 541, 549 (CCPA 1969). Therefore, a series of steps which did not recite physically transforming subject from one state to another was most like an abstract idea. The Supreme Court recognized that mathematical algorithms are "the basic tools of scientific and technological work," Benson, 409 U.S. at 67, 175 USPQ at 675, and should not be the subject of exclusive rights. The worry was that a claim to a process would preempt the use of the mathematical algorithm. Claims truly directed to apparatus as a "machine" or "manufacture" under § 101 were not a problem because the calculation method remains free for use by anyone not employing the specific apparatus. Also, a "machine" or "manufacture" is a tangible thing, not an abstract idea.

The CCPA eventually adopted Judge Rich's position (based on a line of dissenting opinions) that the form of the claim is not determinative. However, only claims drafted in means-plus-function format, which are technically "apparatus" claims, were held to be nonstatutory. The test is stated in Walter, 618 F.2d at 768, 205 USPQ at 408:

If the functionally-defined disclosed means and their equivalents are so broad that they encompass any and every means for performing the recited functions, the apparatus claim is an attempt to exalt form over substance since the claim is really to the method or series of functions itself . . . . In such cases, the burden must be placed on

Appeal No. 1999-1932  
Application 08/795,706

the applicant to demonstrate that the claims are truly drawn to specific apparatus distinct from other apparatus capable of performing the identical functions.

If this burden has not been discharged, the apparatus claim will be treated as if it were drawn to the method or process which encompasses all of the claimed "means." See In re Maucorps, 609 F.2d at 485, 203 USPQ at 815-816; In re Johnson, 589 F.2d at 1077, 200 USPQ at 206; In re Freeman, 573 F.2d at 1247, 197 USPQ at 472. The statutory nature of the claim under § 101 will then depend on whether the corresponding method is statutory.

The treatment of means-plus-function claims as process claims usually arose where the only disclosed structure was a programmed general purpose computer or functional block diagrams. Claims in means-plus-function format were treated as process claims in Walter, Maucorps, Abele, In re Meyer, 688 F.2d 789, 795 n.3, 215 USPQ 193, 198 n.3 (CCPA 1982), and In re Pardo, 684 F.2d 912, 916 n.6, 214 USPQ 673, 677 n.6.

In In re Iwahashi, 888 F.2d 1370, 1375, 12 USPQ2d 1908, 1911-12 (Fed. Cir. 1989), Judge Rich held that 35 U.S.C. § 112, sixth paragraph, precludes interpreting a means-plus-function limitation as encompassing any and every means for performing the function. No mention was made of Walter or the other CCPA cases where claims in means-plus-function format were treated as encompassing any and every means for performing the functions and, hence, as process claims.

Subsequently, the Federal Circuit addressed the Patent and Trademark Office's (PTO's) interpretation of means limitations under 35 U.S.C. § 112, sixth paragraph, in In re Donaldson Co.,



Appeal No. 1999-1932  
Application 08/795,706

16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994) and Alappat. The disclosure in Alappat disclosed specific structure for performing the claimed functions; however, appellant admitted that the claims were broad enough to read on a programmed general purpose computer. The PTO argued that the claim should be treated as a process claim because it covered a programmed general purpose computer as in Walter, Maucorps, Abele, Meyer, and Pardo. That is, if a claim read both on specific structure which is statutory subject matter and on a programmed general purpose computer, which is not specific structure and may be nonstatutory subject matter, the claims should be treated as a process claim. A claim which is broad enough to cover (and thus protect) both nonstatutory and statutory subject matter should be considered to be directed to nonstatutory subject matter. Cf. In re Lintner, 458 F.2d 1013, 1015, 173 USPQ 560, 562 (CCPA 1972) ("Claims which are broad enough to read on obvious subject matter are unpatentable even though they also read on nonobvious subject matter."). The Federal Circuit held that claimed subject matter in means-plus-function language, which read on both special disclosed structure and on a general purpose computer, was statutory subject matter because is directed to a "machine" and appears on its face to be directed to § 101 subject matter. The Federal Circuit noted that the analysis was not over because the mathematical algorithm exception may apply to true apparatus and

Appeal No. 1999-1932  
Application 08/795,706

held that the subject matter was statutory because it produced "a useful, concrete and tangible result," the smooth waveform.

In conclusion, the test for statutory subject matter has changed from the focus on process claims and means-plus-function claims treated as process claims. The new test may be harder to apply than the old tests where subject matter was considered statutory if it was directed to a "machine" or "manufacture."

8. "'[M]achine' claims having 'means' clauses may only be reasonably viewed as process claims if there is no supporting structure in the written description that corresponds to the claimed 'means' elements." State Street, 149 F.3d at 1371, 47 USPQ2d at 1599.

Comment: There no longer appears to be a reason to treat "apparatus" claims in means-plus-function format as a process claim because the test for statutory subject matter has changed. The test does not depend on the statutory category and does not use the Freeman-Walter-Abele test.

What constitutes "a useful, concrete and tangible result"

There is no certain test for how to determine what constitutes a "practical application" or "a useful, concrete and tangible result." The following examples describe claims that were held to be statutory. So far, there are no examples of claims held to be nonstatutory under the new test. See

Appeal No. 1999-1932  
Application 08/795,706

In re Bonczyk, No. 01-1061 (Fed. Cir. May 11, 2001) (unpublished) ("fabricated energy structure" held nonstatutory as not corresponding to any statutory category of subject matter and it was unnecessary to reach the alternate ground of affirmance that the subject matter lacks practical utility); AT&T, 172 F.3d at 1360, 50 USPQ2d at 1453 (discussing how earlier cases did not apply the present test, but not speculating whether the claimed subject matter would have been nonstatutory under the new test).

1. "[I]n Arrhythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed. Cir. 1992), we held that the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it corresponded to a useful, concrete or tangible thing -- the condition of a patient's heart." State Street, 149 F.3d at 1374, 47 USPQ2d at 1602.

2. "In Alappat, we held that data, transformed by a machine through a series of mathematical calculations to produce a smooth waveform display on a rasterizer monitor, constituted a practical application of an abstract idea (a mathematical algorithm, formula, or calculation), because it produced 'a useful, concrete and tangible result' -- the smooth waveform." State Street, 149 F.3d at 1374, 47 USPQ2d at 1602.

Appeal No. 1999-1932  
Application 08/795,706

3. In State Street, dealing with a "machine" claim, it was stated, 149 F.3d at 1373, 47 USPQ2d at 1601:

Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result" — a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

4. In AT&T, dealing with a method claim, it was stated, 172 F.3d at 1358, 50 USPQ2d at 1452:

It is clear from the written description of the '184 patent that AT&T is only claiming a process that uses the Boolean principle in order to determine the value of the PIC indicator. The PIC indicator represents information about the call recipients's PIC, a useful, non-abstract result that facilitates differential billing of long-distance calls made by an IXC's subscriber. Because the claimed process applies the Boolean principle to produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle, on its face the claimed process comfortably falls within the scope of § 101.

#### Analysis

All independent claims require a computer or similar structure: a computer (claims 1, 3, and 13); a "data preparation unit," "population size measurement unit" and "population overlap measurement unit" (claim 5), which are disclosed to be software running on a computer (figure 1; specification, p. 22); a "data preparation unit," "population size measurement unit," "population overlap measurement unit," and "total population information generator" (claim 12), which are disclosed to be

Appeal No. 1999-1932  
Application 08/795,706

software running on a computer (figure 1; specification, p. 22); a method "using a computer" (claims 14, 16, 18, and 23); and a computer program embodied on a computer-readable medium (claim 24). Therefore, all claims are tied to a physical machine, which is disclosed to be a general purpose computer, or physical media for use with a machine. This does not make the claimed subject matter statutory because the statutory category to which a claim is directed is not determinative of statutory subject matter. Nor can it be said that a method being run on a computer inherently has practical utility and represents more than a mere abstract idea. Nevertheless, a programmed computer or process running on a computer is not a disembodied concept and the computer must be given weight in determining whether "a useful, concrete and tangible result" is claimed. The claimed subject matter would be much more of an abstract idea without the computer or computer-readable medium.

Appellants argue that the claims all recite a practical utility in the ability to provide a "population size" or "overlap" when confronted with database of human data that does not have any unique identifiers (Br12).

The Examiner concludes that there is no "practical application" or "useful, concrete and tangible result" because:  
(1) there is no physical action taken after the calculation, such as the post-solution activity of opening a rubber-molding press

Appeal No. 1999-1932  
Application 08/795,706

in Diamond v. Diehr (EA3; EA6); (2) there is no physical data gathering step that indicates manipulation of data representing physical objects or activities, the data is merely labeled human data (EA3; EA5; EA8); (3) there is no physical activity other than the computer reading, calculating, and storing data (EA4); (4) the claims merely describe mathematical steps to calculate a number (EA4; EA5) and data is merely being processed by a computer in accordance with a computer program (EA3-4); (5) there are no physical objects being manipulated and no transformation of any kind (EA6); (6) there is no data representing a physical object, such as the data representing heart activity in Arrhythmia (EA7); (7) there is no conversion or transformation of data like that in Alappat; (8) there is no immediate, real-world benefit claimed, unlike State Street (EA7); (9) the specific applications to an AIDS database, the Gulf War Registry, or the National Breast Cancer Registry are not claimed; (10) the preambles are mere statements of intended use (EA8).

We do not agree with the Examiner's reasons in view of State Street and AT&T. There is no longer any requirement for physical data gathering (pre-solution) or post-solution activity as argued in (1) and (2); this was part of the now disfavored Freeman-Walter-Abele test. There is no requirement for any physical activity or transformation in addition to the computer calculation as argued in (3), (4), and (5); State Street

Appeal No. 1999-1932  
Application 08/795,706

specifically states that transformation of data may be enough. The subject matter does not have to be exactly analogous to that in Arrhythmia, Alappat, or State Street as argued in (6), (7), and (8), because every case will be unique; the test is whether there is "practical application" or "a useful, concrete and tangible result." The claims do not recite a specific database as noted in (9); however, while a more specific description of the data would make it easier to find "a useful, concrete and tangible result," these registries are databases containing human data and it seems that question of statutory subject matter should not turn on whether the type of data is claimed generically. As to (10), the claims all require calculating "population size" or "overlap" in the claim bodies.

We conclude that the claimed apparatus, method, and program embodied on a tangible medium for calculating a "population size" or "overlap" recite a "practical application" and "a useful, concrete and tangible result" and, thus, constitutes statutory subject matter. Calculation of an accurate "population size," i.e., a quantity of unique individuals in a data source containing potentially multiple records pertaining to a particular individual, and/or an accurate "population overlap," i.e., a quantity of unique individuals overlapping across multiple data sources which may contain multiple records pertaining to a particular individual within a single data source

Appeal No. 1999-1932  
Application 08/795,706

or within multiple data sources, is considered a "practical application" of the claimed "decomposed probabilistic calculations" and the other mathematical calculations, such as "subtracting a probabilistic incremental number of unique entities" (e.g., claims 3 and 5) and using the "gender/year of birth cohorts" (e.g., claim 12). That is, mathematics and probability theory are applied to solve the practical problems of "population size" and "population overlap." The data represents humans which are real objects, not just a number. The calculated "population size" and "population overlap" are "useful results" because there is a real world need for such data (e.g., "Government and private industry need to know the number of people who are involved in more than one institution, program, group, or activity, either concurrently or in sequence for purposes of management, monitoring, and evaluation" (specification, p. 1, lines 20-22)) and it is an improvement over known prior art methods (specification, pp. 3-5). "Population size" and "overlap" are "concrete and tangible results" because the numbers represent numbers of unique humans in a data set(s).

It is true that the claims do not recite specific data other than human data. Our impression from the Examiner's rejection is that the Examiner would have less trouble holding the claimed subject matter to be a practical application if the claims specifically recited that the database was, for example, the Gulf





Appeal No. 1999-1932  
Application 08/795,706

STAAS & HALSEY  
Suite 500  
700 Eleventh Street, N.W.  
Washington, DC 20001